

REMARKS

The above-noted application has once again been carefully reviewed in light of the most recent and final Office Action dated July 1, 2009 and the citations applied by the Examiner in formulating a rejection of all of the claims under the provision of 35 U.S.C.103(a).

Counsel for the Applicant appreciates the detail to which the Examiner has analyzed the prior claims in formulating his rejection.

In order to more clearly define the inventive method over the prior art, a new parent claim 34 is submitted herewith which combines features of prior claims 6, 24 and 25 which have now been cancelled.

The claims have been rejected as unpatentable over the patent of *Shibata et al.* Pat. No. 6,466,831 taken in view of the teaching of *Kopelman et al.* Pat. No. 6,664,986. In the rejection of Claims 19-20, 22, 32 and 33, the Examiner also relies upon the published patent application of *Rubbert et al.* 2002/001010568 in combination with *Shibata et al.* and *Kopelman et al.* Applicant respectfully traverses these rejections as more clearly set forth below.

The invention claimed herein relates to a method for displaying a digitized dental technical object, such as a dental prosthesis, a model of at least a single tooth, or an area of the jaw that is to be provided with the dental

prosthesis. The display appears on a monitor on the basis of a right-angled coordinate system with X, Y, and Z axes. The Z-axis and the Y-axis and the intersection (origin of the coordinate system) run in the image plane of the monitor and the X-axis runs perpendicular to the image plane. The dental technical object is rotated about two axes running perpendicular to each other and is shifted along the X-axis for zooming the object.

This method may be used such that an intuitive and simple adjustment of virtual models of dental objects, and in particular, teeth or rows of teeth, are made possible within the framework of visualizing scanned data as well as CAD models of artificial dentures. Further, due to the digitized data of the area of the jaw to be provided with the dental object, one or more tooth stems and artificial dentures are visually shown on the monitor which assists in the manufacture of these dental objects based on the data.

In order to solve the existing problems, the dental technical object is aligned along a T-axis running in a plane defined by the X-axis and the Y-axis and passing through the origin of the coordinate and is moved to a maximum of five degrees of freedom, whereby a rotation (Rot_z) about the Z-axis is chosen as the first degree of freedom, a rotation (Rot_t) about the T-axis is chosen as the second degree of freedom, a translation of the object along the T-axis is chosen as the third degree of freedom and the translation of the object along the X-axis is chosen as the fourth degree of freedom.

In contrast to technical 3D-CAD systems, with whose assistance objects can be displayed and manipulated, requiring

object movement around all six degrees of freedom, a simplified reduction occurs according to the present invention using 4 or 5 degrees of freedom. In the instant case, it is sufficient to consider the virtual dental crowns and the are of the jaw to which they are to be used. Surrounding areas, such as jaw bones, lips, and the tongue are not of importance for technical dental restorations, and are not therefor digitized. Further, the tooth root which is covered by the gums and the inside of the tooth are not taken into account with computer-assisted tooth restoration.

It is apparent from the recent Office Action that a number of features have been objected to because "They are all up to the choices of the users". (See page 6 of the Action, paragraphs 18-20).

The Examiner has not located any prior art that anticipates or suggests the substance of the remaining claims as amended.

Taking into account additionally that the new claim 34 instructs imperatively that a dental technical object displayed on a monitor is moved to a maximum of five degrees of freedom for being displayed to the extend necessary, it should be recognized that the new teaching of the invention as claimed fulfills conditions of both novelty and invention.

The Examiner has made rather unsupported explanations with respect to the feature of "five degrees of freedom", stating that this "is an obvious variance" (page 5 of the Action) without any reasonable comment as to why this would be an obvious variance of the state of the art.

Numerous features of this application cannot be learned or suggested from the art of record, namely, that the longitudinal axis of the dental technical object is formed by a traverse polygon with straight lines connecting the sections of the dental technical object, that for shifting the dental-technical object along the T-axis, the dental technical object is shifted along a straight line of the traverse polygon which passes through the origin of the coordinate system, whereby for shifting the dental technical object along the consecutive first and second straight lines forming the angle β and wherein $\beta \neq 180^\circ$, the dental technical object is rotated about the angle β about the Z-axis after completion of the shifting along the first straight line before shifting the object along the second straight line.

This allows even an user with limited practice to adjust a virtual model of the dental technical object intuitively and easily using simple methods. The single sections of the dental technical object can be easily checked without any danger that it will vanish from the visual range of the monitor.

The features noted above cannot be found in the cited prior art. Further one of ordinary skill in this art could not find any hint in the art for the inventive features in the present claims. In this regard, it must be understood that *Kopelman et al.* relates exclusively to the display of a dental technical object on a monitor, however it lacks any suggestion to change intuitively the position of an elongated dental technical object on a monitor without using any graphic symbols displayed on the monitor.

It is also the object of *Kopelman et al* to allow an untrained operator to manipulate a virtual 3D dental model (see column 2, lines 54-55). However, for this purpose totally different methods are chosen with no parallels to the invention claimed herein.

Reading *Kopelman et al.* and according to column 3, lines 4 et seq., the following steps are suggested:

"(a) providing a graphic user interface (GUI) that includes a graphic representation of the dental model and a plurality of graphic symbols each representative of at least one desired pre-set view of the dental model or a portion thereof from respective desired directions;

(b) selecting by means of said input device a graphic symbol from among said plurality of graphic symbols;

(c) responsive to the selection of said graphic symbol, moving the dental model or portion thereof to at least one pre-set view which corresponds to said graphic symbol, whilst retaining the model essentially in zoom."

Neither a T-axis nor a polygon line is used for displaying an elongated dental technical object and shifting it. Therefor, no parallel to the present invention are given.

Certainly, the comment of the Examiner that the degree of freedom is considered as an obvious variance is erroneous.

Care has been taken to include no new matter or issues in the new claim 34

In summary, the invention provides a method for adjusting a monitor displayed digitized section of, for example, a row of teeth, in a coordinate system using a input device, whereby the object is aligned around a maximum of five, but preferably four degrees of freedom.

In light of the amendments made herein and the comments noted above, reconsideration of the final rejection of the claims is solicited.

Respectfully submitted,



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October 5, 2009